

Amendments to the Drawings:

The attached sheets of drawings include changes to all of the drawing figures—i.e., Figures 1, 2A, 2B, 3-7, 8A, 8B, 9-11, 12A, 12B, 13, 14, 15A, 15B, 16, 17A, 17B, 18A and 18B. These sheets, which include 1, 2A, 2B, 3-7, 8A, 8B, 9-11, 12A, 12B, 13, 14, 15A, 15B, 16, 17A, 17B, 18A and 18B, replace the original and substitute sheets that included Figures 1, 2A, 2B, 3-7, 8A, 8B, 9-11, 12A, 12B, 13, 14, 15A, 15B, 16, 17A, 17B, 18A and 18B.

Attachment: Replacement Sheets

Remarks

Claims 18-20 and 22-37 are pending in the application, and each was rejected. Based on the following, reconsideration of the claim rejections is requested.

Drawings

The Examiner objected to the drawings, and by this paper, each of the drawings is replaced with a formal drawing illustrating more clearly the subject matter of the original drawings. Applicant believes that the new drawings meet all requirements and respectfully requests that the objection be withdrawn.

Claim Rejections—35 U.S.C. § 103

The Examiner rejected claims 18-20, 22, 23, 27-31 and 34 under 35 U.S.C. § 103(a) as being unpatentable over Japanese Publication No. JP8-144927 ("the '927 Publication") in view of U.S. Patent Publication No. 2001/0036411 (Walker). At the outset, Applicant notes that the issues associated with the design and use of a vane pump, such as described in the Walker reference, can be markedly different from those encountered in the design and use of a radial piston pump, such as claimed in the present application. As such there is no reason to combine the cited references. Even if combined, however, Applicant submits that the combination fails to teach or even suggest all of the claim limitations of any of the rejected claims.

Claim 18 of the present application claims a radial piston hydraulic machine that is operable as a pump and a motor. The hydraulic machine includes: "a rotatable valve plate having a plurality of apertures therethrough, at least some of the apertures communicating with the high pressure fluid port and at least some of the apertures communicating with the low pressure fluid port" The rotatable valve plate that is claimed has well defined limitations associated with it that distinguish it from the two valve plates described in the '927 Publication.

Specifically, at least some of the apertures in the claimed valve plate communicate with the high pressure port, and at least some of the apertures communicate with the low pressure port. Thus, in one valve plate are found different apertures communicating with both high and low pressure ports. One embodiment is illustrated in Figure 15A, which shows a valve plate 260 having apertures 262—see Figures 17A and 17B—some of which communicate with a high pressure port 228 and some of which communicate with a low pressure port 230—see Figure 15B.

The claimed configuration differs significantly from the hydraulic machine described in the '927 Publication. In Drawings 2 and 8 of the '927 Publication, it is clearly illustrated that one plate 12 is on the high pressure side (H) and the other plate 14 is on the low pressure side (L). The machine of the '927 Publication requires two plates, one on each of the high and low pressure sides. In contrast, the invention claimed in claim 18 of the present application provides for communication with both high and low pressure ports in a single valve plate. This configuration provides advantages over the machine described in the '927 Publication, which requires a pair of plates.

In addition, claim 18 claims an hydraulic machine which can operate as a pump and a motor merely by controlling the valve plate such that the fluid paths between the high and low pressure ports connect with the cylinders when the pistons are in different portions of their respective strokes. That is, the valve plate can be controlled to connect the high pressure fluid port to certain cylinders "when corresponding pistons are in a power stroke and between the cylinders and the low pressure fluid port when corresponding pistons are in an exhaust stroke, thereby facilitating operation of the hydraulic machine as a motor." The valve plate can also be controlled to connect the high pressure fluid port to certain cylinders "when corresponding pistons are in an exhaust stroke and between the cylinders and the low pressure fluid port when corresponding pistons are in a power stroke, thereby facilitating operation of the hydraulic machine as a pump." Conversely, the machine described in the '927 Publication requires additional elements to be added to the machine to change its operation from a motor to a pump.

Paragraphs 0035-0037 of the '927 Publication describe the differences between the use of the machine as a motor (described in previous paragraphs of the specification) and its

use as a pump (described in these paragraphs). Specifically, the '927 Publication states that "[the pump] is only different from the radial piston motor of the 1st example of the above that this example [the pump] has arranged the energization means slack compression coil spring 40 which energizes ball pistons (9a etc.)," see Paragraph 0036 and Drawing 6. Thus, it is only with the addition of coil springs in each of the cylinders that the machine in the '927 Publication can be changed from a motor to a pump. This is not true of the present invention as claimed in claim 18, or as claimed in claim 20. In each of these claims, control of the valve plate can change operation of the machine from a motor to a pump (and back) without having to go to the time and expense of disassembling the machine to add or remove springs.

With regard to the Walker reference, Applicant notes that the configuration of vane pumps and motors is radically different from piston pumps and motors, and therefore, the technology used in one is not obviously adapted to the other. Even so, Walker does not describe the use of a valve plate as claimed in claims 18 and 20 of the present application. Rather, the Walker reference describes a component called a "chamber ring 86", which is separate from and in addition to first and second end plates 70, 76, which contain various apertures for fluid flow. The chamber ring 86 (see Figure 5 of Walker) does not have "a plurality of apertures" as claimed in claims 18 and 20; instead, it has an inner wall 98 with four segments 104, 106, 108, 110 having various radii machined therein—see Para. 0078. Because it is a vane pump/motor, the chamber ring 86 can be moved linearly from left to right, and right to left, to change operation from a pump to a motor—see Para. 0075. In summary: (1) the chamber ring moves linearly to change operation of the machine from a pump to a motor, (2) the chamber ring does not have a plurality of apertures to connect with high and low pressure ports (it has a single bore with a multiple radii surface), and (3) it relies on separate end plates with arcuate fluid ports to provide the fluid flow.

Based on the foregoing, Applicants maintain that the invention as claimed in claim 18 and 20 provides advantages over the prior art, and that each contains limitations that are neither taught nor suggested by the combination of the '927 Publication and Walker. Applicants therefore believe that claims 18 and 20 are patentable over the cited combination.

With regard to claim 19, an hydraulic machine is claimed, which includes first and second plates, each being defined by certain limitations not found in the cited combination. Specifically, the hydraulic machine of claim 19 includes "a first plate configured to be rotatably driven by the rotor, and having a first surface configured to contact one end of each of the cylinders and to allow each of the contacting cylinder ends to slide relative to the first surface...." One embodiment of this is illustrated in Figure 5—see first plates 146 in contact with cylinders 142. Figure 8A illustrates a first surface 154 as claimed. In addition to the first plate, a second plate is also claimed in claim 19, and the second plate includes "at least three plate ports therein, each of the plate ports being configured to cooperate with at least one aperture in the first plate and one housing port, thereby facilitating fluid flow between a housing port and at least one cylinder, the second plate being rotatable relative to the housing ports to modify the transformer pressure ratio." No such claim limitations are taught or suggested by the cited combination.

First, Walker teaches a vane pump, and so there can be no plate "having a first surface configured to contact one end of each of the cylinders," and second, the two plates described in the '927 Publication do not contact the cylinders at all—see, e.g., Drawings 1 and 7. As for a second plate, such as claimed in claim 19 of the present application, the '927 Publication does not teach or suggest such a plate, and, as discussed in detail above, Walker describes a chamber ring having a single bore of varying radii—this does not teach or suggest the second plate of claim 19. Therefore, Applicant believes that claim 19 is patentable over the cited combination.

Claim 22 of the present application recites an hydraulic machine having limitations similar to those found in claim 18 and 20; however, claim 22 also claims "a housing having one portion with a plurality of radially oriented cylinders disposed therein, and another portion configured to be disposed substantially around the one portion and including a tapered bore to facilitate sealing of the cylinders, the housing including a high pressure fluid port and a low pressure fluid port...." One embodiment of such a tapered bore is illustrated in Figure 15A. Such a tapered bore facilitates a positive radial seal as the portions of the housing are fastened together axially. This can allow the hydraulic machine of the present application to operate at high pressures while still maintaining seal integrity. The additional seal that can be gained

through the use of the tapered bore can eliminate the problems associated with fluid leaking from the cylinders when the hydraulic machine is in use. No such advantages are provided in the cited combination of references, which does not teach or even suggest the limitations of claim 22. Therefore, Applicant believes claim 22 to be allowable over the combination of references.

Dependent claims 23, 27-31 and 34 each have one of claims 18, 19 or 22 as its base claim. Each of these dependent claims contains all of the limitations of its respective base claim, as well as additional limitations that further distinguish it from the cited references. For example, claim 27, in addition to having all of the limitations of claim 19, further describes the first plate as including "a plate portion having the first surface thereon and a separate hub portion attachable to the plate portion, thereby allowing the first surface to receive a smooth finish prior to assembling the plate portion to the hub portion, thereby facilitating sealing between the first surface and the cylinders." The other dependent claims likewise have distinguishing limitations, and therefore, Applicant submits that each is patentable over the cited combination of references.

Claim Rejections—35 U.S.C. § 102

The Examiner rejected claims 18-20 and 22-37 under 35 U.S.C. § 102(b) as being anticipated by Walker. Applicant has described in detail above how Walker, even when combined with the '927 Publication, does not teach or even suggest the limitations found in any of the independent claims, claims 18, 19, 20 and 22. It follows, therefore, that none of these claims have each and every element expressly or inherently described by Walker alone. For example, each of the independent claims recites an hydraulic machine, which, among other elements, includes a plurality of pistons and a plurality of cylinders to receive the pistons. Fluid in the cylinder is either acted upon or acts upon a corresponding piston. In contrast, Walker teaches a vane pump, and although it is mentioned that the vanes can move radially, effectively acting as a piston, there are no piston cylinders wherein the pistons (vanes) interact with the fluid. Anticipation requires that "the identical invention be shown in as complete detail as is contained in the ... claim." (MPEP §2131, citation omitted.) Applicant respectfully submits that this strict requirement has not been met with regard to independent claims 18-20 and 22. Because one of

these is the base claim for each of the remaining rejected claims, Applicant believes that each of claims 18-20 and 22-37 is patentable over Walker.

The Petition fee of \$245.00 is being charged to Deposit Account No. 02-3978 via electronic authorization submitted concurrently herewith. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments as a result of the filing of this paper to Deposit Account No. 02-3978.

Respectfully submitted,

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